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6. SÆLANIA

Stems bluntly triangular in cross section. Leaves linear-lanceolate, serrate, glaucous, with white-filamentous or granular dorsal surface; vein extending to apex. Calyptra cucullate. Seta erect. Capsule exserted, ovoid-cylindric, erect, smooth or slightly furrowed when dry; lid conic; annulus single; peristome-teeth 16, split, nodose, papillose. Spore small, papillose.—(Honor of Sælan, a Scandinavian bryologist.) We have only the following species.

*Sælania glaucescens*¹³ (Hedw.) Broth.—Alaska to B.C.; northern N. Amer.

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PRELIMINARY LIST OF ARIZONA HEPATICÆ¹

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Very few species of Hepaticæ have been reported from Arizona. The first records for the state were made in 1895 by Underwood,² who noted the occurrence of *Marchantia polymorpha* and *Reboulia hemisphaerica*, without citing definite stations. Four additional species have since been reported by the writer, as follows: *Plagiochasma rupestre* and *P. Wrightii*, in 1915;³ *Frullania mexicana*, also in 1915;⁴ and *Marchantia paleacea*, in 1917.⁵ Of these six species, *Marchantia paleacea*, although not endemic to Arizona, is known from no other stations in the United States.

The following list is based largely on the collections made by G. E. Nichols, while participating in the International Phytogeographic Excursion in America. This has been supplemented by the material in the herbarium of the New York Botanical Garden and by specimens kindly communicated by W. A. Cannon, D. S. Johnson, F. Shreve, and J. J. Thornber. Although future collections will undoubtedly lengthen the list appreciably, it is hardly to be expected that many conspicuous species remain to be discovered.

1. RICCIA GLAUCA L. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols*.

2. RICCIA SOROCARPA Bisch. Cherry Creek, Santa Catalina Mountains, 1913, *G. E. Nichols*; summit of Mt. Lemmon, Santa Catalina Mountains, *F. Shreve*.

3. RICCIELLA FLUITANS (L.) A. Br. Soldier Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols*; Sabino Canyon, Santa Catalina Mountains, *F. Shreve*.

4. TARGIONIA HYPOPHYLLA L. Bright Angel Trail, bottom of Grand Canyon, 1913, *G. E. Nichols*; Sabino Canyon, Santa Catalina Mountains, *J. J. Thornber*; Miller Canyon, Huachuca Mountains, *F. Shreve*.

¹³ *Sælania caesia* Lindb.; *Ditrichum glaucescens* Hampe.

¹ Contribution from the Osborn Botanical Laboratory.

² Bot. Gaz. **20**: 69, 70. 1895.

³ Bull. Torrey Club **42**: 279, 295. 1915.

⁴ BRYOLOGIST **18**: 88. 1915.

⁵ Trans. Connecticut Acad. **21**: 254. 1917.

5. *PLAGIOCHASMA RUPESTRE* (Forst.) Steph. Without definite locality or date, *H. H. Rusby*; Soldier Canyon, Santa Catalina Mountains, 1913, *W. A. Cannon*; same locality, *G. E. Nichols*.

6. *PLAGIOCHASMA WRIGHTII* Sulliv. Nogales, 1902, *D. T. MacDougal*.

7. *GRIMALDIA CALIFORNICA* Gottsche. Cottonwood Springs and Soldier Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols*; Bear Canyon and Sabino Canyon, Santa Catalina Mountains, *F. Shreve*. The specimens are all sterile, so that their determination must be considered provisional.

8. *REBOULIA HEMISPHERICA* (L.) Raddi. Willow Spring, 1890, *E. Palmer* 535; Huachuca Mountains, *J. G. Lemmon* 210; *L. N. Goodding* 752; Soldiers Canyon, Santa Catalina Mountains, *G. E. Nichols*; Sabino Canyon, Santa Catalina Mountains, *J. J. Thornber*; same locality, *F. Shreve*; Clearson's Mill, Graham Mountains, *F. Shreve*.

9. *ASTERELLA CALIFORNICA* (Hampe) Underw. Bright Angel Trail, bottom of Grand Canyon, 1913, *G. E. Nichols*. The specimens seem to be dioicous, but the absence of carpocephala makes their determination doubtful.

10. *CONOCEPHALUM CONICUM* (L.) Dumort. Frye Canyon, Graham Mountains, 1914, *F. Shreve*.

11. *MARCHANTIA PALEACEA* Bertol. Huachuca Mountains, 1910, *L. N. Goodding* 824.

12. *MARCHANTIA POLYMORPHA* L. Miller's Canyon and Wickersheim's Cabin, Huachuca Mountains, 1909, *L. N. Goodding* 111, 362.

13. *FOSSOMBRONIA LONGISETA* Aust. Cherry Creek, Santa Catalina Mountains, 1913, *G. E. Nichols*.

14. *PLAGIOCHILA ASPLENIODES* (L.) Dumort. North side of Mt. Lemmon, Santa Catalina Mountains, 1912, *D. S. Johnson*.

15. *CEPHALOZIELLA HAMPEANA* (Nees) Schiffn. Cottonwood Springs, Santa Catalina Mountains, 1913, *G. E. Nichols*.

16. *CEPHALOZIELLA MYRIANTHA* (Lindb.) Schiffn. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols*.

17. *CEPHALOZIELLA PAPILLOSA* Douin. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols*.

18. *SCAPANIA UNDULATA* (L.) Dumort. Marshall Gulch, Santa Catalina Mountains, 1912, *D. S. Johnson*.

19. *RADULA COMPLANATA* (L.) Dumort. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols*.

20. *FRULLANIA MEXICANA* Lindenb. North side of Mt. Lemmon, Santa Catalina Mountains, 1912, *D. S. Johnson*.

21. *ANTHOCEROS LAEVIS* L. Xero-montane Garden and Sabino Canyon, Santa Catalina Mountains, 1914, *F. Shreve*.

Of the species listed Nos. 1-12 belong to the Marchantiales, Nos. 13-20 to the leafy Jungermanniales, and No. 21 to the Anthocerotales. The large proportion of thalloid forms is an interesting feature of the flora and indicates its strongly xerophilous character. Many of these forms are able to pass through long periods of drought in a quiescent state and then to recover and resume their

growth when conditions become more favorable. In some cases the dry plants are so inconspicuous that it is almost impossible to detect them. In discussing the hepatic flora of western California, Campbell⁶ calls attention to many interesting peculiarities of xerophilous species, and his remarks would apply equally well to the hepatic flora of Arizona.

The state of Arizona is bounded by Mexico, California, Nevada, Utah, and New Mexico, while its northeastern corner meets the southwestern corner of Colorado. The Hepaticae of Nevada and Utah are almost unknown, so that it is impossible to make profitable comparison between the hepatic floras of these states and that of Arizona. The Hepaticae of California, however, are known to us through the thorough and comprehensive work of Howe,⁷ who recognizes eighty-six species, inclusive of the Anthocerotites. For Colorado the writer⁸ has listed forty-one species, while Standley⁹ has reported twelve species from New Mexico. The Hepaticae of Mexico were long ago described by Gottsche,¹⁰ and only scattered references to them have since been published. Perhaps four hundred species would be a conservative estimate for the entire country. Of the twenty-one species listed from Arizona, fifteen have been recorded from California, nine from Colorado, five from New Mexico, and twelve from Mexico. These figures would indicate a close relationship between the species of Arizona and those of California and Mexico. The number of Arizona species known from New Mexico is surprisingly small and would probably be increased by careful exploration. A closer relationship between the species of these two states is certainly to be expected.

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SOME EXPERIMENTS ON THE GERMINATION OF MOSS SPORES ON AGAR

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In November, 1915, I collected *Pogonatum brevicaulis*. This moss is quite common on freshly turned clay banks. It is characterized by a persistent protenema, the leaves being few and short. It fruits in the autumn.

The material was kept in petrie dishes in the greenhouse of Columbia University. In April, I sowed spores of these plants in petrie dishes in which I had prepared a Beijerinck agar culture.

⁶ Torreyia **4**: 81-86. 1904.

⁷ The Hepaticae and Anthocerotites of California. Mem. Torrey Club **7**: 1-208. pl. 88-122. 1899.

⁸ Preliminary list of Colorado Hepaticae. BRYOLOGIST **18**: 44-47. 1915.

⁹ Hepaticae of New Mexico. BRYOLOGIST **18**: 81-83. 1915. Additional notes upon New Mexican Hepaticae. BRYOLOGIST **19**: 64, 65. 1916.

¹⁰ De mexikanske Levermasser. Kongel. Danske Vidensk. Selsk. Skr. V. Naturv. og Math. Afd. **6**: 97-380. pl. 1-20. 1863.